

## **Amendments to the claims:**

1. (Currently Amended) A method of secure communication between a resource-constrained device and remote network nodes over a network wherein the resource-constrained device acts as a standalone network node and the remote network nodes communicate with the resource-constrained device using unmodified network clients and servers and wherein the resource-constrained device has a central processing unit, a random access memory, a non-volatile memory, a read-only memory, and an input and output component, comprising:

- i. using a physical link selected from one of several physical link methods;

- assigning a network address to the resource-constrained device thereby enabling the resource-constrained device to act as a standalone network node;

- ii. executing on the resource-constrained device a communications module implementing networking protocols and one or more link layer communication protocols, operable to communicate with a host computer, operable to communicate with remote network nodes using the networking protocols and operable to implement network security protocols thereby setting a security boundary inside the resource-constrained device;

- iii. implementing an execution model, wherein the communication module is driven by input events and by the applications and wherein the resource-constrained device ~~uses at least one optimization technique selected from:~~ optimized memory usage by sharing data buffers between one or more communications protocol layers or security protocol layers;

- ~~iv. swapping data from the random access memory to the non-volatile memory;~~
  - ~~v. swapping data from the non-volatile memory to the random access memory;~~
  - ~~vi. sharing data buffers between one or more communications protocol layers or security protocol layers;~~
  - ~~vii. executing on the host computer one or more link layer communication and networking protocols operable to communicate with the resource-constrained device and operable to communicate with the remote network nodes; and~~
  - ~~viii. executing one or more secure network applications on the resource-constrained device wherein the network applications call upon the communication module of the resource-constrained device to communicate with the host computer or the remote network node using the networking protocols and network security protocols and wherein the secure network applications are securely accessible by the remote network nodes using un-modified network clients and servers.~~
2. (ORIGINAL) The method of Claim 1 wherein the physical link is selected from the set including full-duplex serial connection, half-duplex serial connection, USB connection, contactless radio connection.
3. (ORIGINAL) The method of Claim 2 wherein the physical link is a full-duplex serial connection using the serial peripheral interface protocol.
4. (ORIGINAL) The method of Claim 1 further comprising connecting an interface device between the resource constrained device and the host computer using a physical link that is a serial connection having half-duplex

between the resource constrained device and the interface device and full-duplex between the interface device and the host computer.

5. (ORIGINAL) The method of Claim 4 further comprising operating the interface device to perform a bridging function between the half-duplex connection and the full-duplex connection.
6. (ORIGINAL) The method of Claim 5 wherein the step of performing a bridging function further comprises providing at least one of function selected from:
  - i. enabling a resource constrained device operating in a command/response mode to communicate with network nodes as a peer;
  - ii. enabling a resource constrained device operating in half-duplex communication mode to handle full-duplex communication traffic;
  - iii. encapsulating upper layer protocol frames;
  - iv. enabling transportation of upper layer protocol frames exceeding a frame size limit of the lower link layer; and
  - v. supporting multiple logical connections of upper layer protocols.
7. (ORIGINAL) The method of Claim 4 of operating a software module on the interface device according to a finite state machine permitting the interface device to forward messages between the resource constrained device and the network wherein the interface device is in one of the at least one states permitting the resource constrained device to initiate and send messages.

8. (ORIGINAL) The method of Claim 7 wherein the at least one state is selected from a set of states corresponding to the interface device transmitting a Send, a Put, and a Poll command, respectively.
9. (ORIGINAL) The method of Claim 4 of operating a software module on the host computer according to a finite state machine having at least one state permitting the resource constrained device to transmit messages to the network wherein the software module is in one of the at least one states permitting the resource constrained device to initiate and send messages.
10. (currently amended) The method of Claim 9 wherein the at least one state permitting the resource constrained device to transmit messages to the network is selected from a set of states corresponding to the interface device transmitting a Send, a Put, and a Poll command, respectively.
11. (ORIGINAL) The method of Claim 9 comprising the step of operating the resource constrained device according to a finite state machine having at least one state in which the resource constrained device waits for a message from the host computer indicating that the resource constrained device may transmit a message.
12. (ORIGINAL) The method of Claim 4 further comprising:
  - i. operating the resource constrained device according to a finite state machine whereby the resource constrained device uses the response status at the end of the response to the command sent by the host computer or an intermediate device to indicate that the resource constrained device wants to transmit information to the host computer or to the network.
13. (ORIGINAL) The method of Claim 12 where in the step of operating the resource constrained device comprises operating the resource constrained

device according to a finite state machine having at least one state in which the resource constrained device waits for a message indicating to the resource constrained device that the resource constrained device may transmit information to the host.

14. (ORIGINAL) The method of Claim 13 further comprising operating the resource constrained device to transition among the states of the finite state machine.

15. (ORIGINAL) The method of Claim 12 further comprising:

- i. operating the host computer or an intermediate device connected between the host computer and the resource constrained device according to a finite state machine to transmit a polling message to the resource constrained device checking if the resource constrained device may want to transmit information to the host computer.

16. (currently amended) The method of Claim 15 wherein the host computer or intermediate device includes a Remote Access Server (RAS) and wherein ~~wherein~~ the step of operating the host computer or intermediate device comprises operating the host computer or intermediate device according to a finite state machine having a Polling state in which the host computer or intermediate device polls the resource limited device, a Get-from-card state in which the host computer or intermediate device obtains packets of data from the resource constrained device, a Putting-to-card state in which the host computer or intermediate device transmits data to the resource constrained device, and a Checking RAS state in which the host computer or intermediate device checks whether RAS has any data to transmit to the resource constrained device.

17. (ORIGINAL) The method of Claim 16 further comprising operating the host computer or the intermediate device to transition among the states of the finite state machine.
18. (ORIGINAL) The method of Claim 1 wherein the resource-constrained device is a smart card.
19. (ORIGINAL) The method of Claim 1 wherein the resource-constrained device is a MultiMediaCard (MMC).
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61. (currently amended) A system providing secure communication between a resource-constrained device and remote network nodes over a network wherein the remote network nodes communicate with the resource-constrained device using un-modified network clients and servers and wherein the resource-constrained device has a central processing unit, a random access memory, a non-volatile memory, a read-only memory, and an input and output component, the system comprising:
  - i. a physical link connecting the resource-constrained device and a host computer, the physical link selected from one of several physical link methods;  
logic to assign a network address to the resource-constrained device thereby enabling the resource-constrained device to act as a standalone network node;
  - ii. the resource-constrained device comprising a communications module implementing networking protocols and one or more link layer communication protocols, operable to communicate with the host computer, operable to communicate with remote network nodes using the networking protocols and operable to implement network security protocols thereby setting a security

- boundary inside the resource-constrained device, wherein the communication module is driven by input events and by the applications and wherein the resource-constrained device uses at least one optimization technique selected from: optimizes memory usage by sharing data buffers between one or more communications protocol layers or security protocol layers;
- ~~iii.~~ swapping data from the random access memory to the non-volatile memory;
  - ~~iv.~~ swapping data from the non-volatile memory to the random access memory;
  - ~~v.~~ sharing data buffers between one or more communications protocol layers or security protocol layers;
  - ~~vi.~~ the host computer comprising logic implementing one or more link layer communication networking protocols operable to communicate with the resource-constrained device and operable to communicate with the remote network nodes; and
  - ~~vii.~~ the resource-constrained device further comprising one or more secure network applications wherein the network applications call upon the communication module of the resource-constrained device to communicate with the host computer or the remote network node using the networking protocols and network security protocols and wherein the secure network applications are securely accessible by the host computer or the remote network nodes using un-modified network clients or ~~and~~ servers.

62. (previously presented) The system of Claim 61 wherein the physical link is selected from the set including full-duplex serial connection, half-duplex serial connection, USB connection, contactless radio connection.

63. (previously presented) The system of Claim 62 wherein the physical link is a full-duplex serial connection using the serial peripheral interface protocol.
64. (previously presented) The system of Claim 61 further comprising an interface device between the resource constrained device and the host computer, the interface device using a physical link that is a serial connection having half-duplex between the resource constrained device and the interface device and full-duplex between the interface device and the host computer.
65. (previously presented) The system of Claim 64 further whereing the interface device comprises logic to perform a bridging function between the half-duplex connection and the full-duplex connection.
66. (previously presented) The system of Claim 65 wherein the logic to perform a bridging function further comprises logic to provide at least one of function selected from:
- i. enabling a resource constrained device operating in a command/response mode to communicate with network nodes as a peer;
  - ii. enabling a resource constrained device operating in half-duplex communication mode to handle full-duplex communication traffic;
  - iii. encapsulating upper layer protocol frames;
  - iv. enabling transportation of upper layer protocol frames exceeding a frame size limit of the lower link layer; and
  - v. supporting multiple logical connections of upper layer protocols.



67. (previously presented) The system of Claim 64 wherein the interface device further comprises logic to operate the interface device according to a finite state machine permitting the interface device to forward messages between the resource constrained device and the network wherein the interface device is in one of the at least one states permitting the resource constrained device to initiate and send messages.
68. (currently amended) The system of Claim 67 wherein the at least one state permitting the resource constrained device to transmit messages to the network is selected from a set of states corresponding to the interface device transmitting a Send, a Put, and a Poll command, respectively.
69. (previously presented) The system of Claim 64 of wherein the host computer further comprises logic to operate the host computer according to a finite state machine having at least one state permitting the resource constrained device to transmit messages to the network wherein the software module is in one of the at least one states permitting the resource constrained device to initiate and send messages.
70. (previously presented) The system of Claim 69 wherein the at least one state is selected from a set of states corresponding to the interface device transmitting a Send, a Put, and a Poll command, respectively.
71. (previously presented) The system of Claim 69 wherein the resource constrained device comprises logic to operate the resource constrained device according to a finite state machine having at least one state in which the resource constrained device waits for a message from the host computer indicating that the resource constrained device may transmit a message.
72. (previously presented) The system of Claim 64 wherein the resource constrained device further comprises logic to operate the resource constrained

device according to a finite state machine whereby the resource constrained device uses the response status at the end of the response to the command sent by the host computer or an intermediate device to indicate that the resource constrained device wants to transmit information to the host computer or to the network.

73. (previously presented) The system of Claim 72 wherein the logic to operate the resource constrained device according to a finite state machine further comprises logic to operate the resource constrained device according to a finite state machine having at least one state in which the resource constrained device waits for a message indicating to the resource constrained device that the resource constrained device may transmit information to the host.

74. (previously presented) The system of Claim 73 further the logic to operate the resource constrained device according to a finite state machine further comprises logic ~~to~~ to operate the resource constrained device to transition among the states of the finite state machine.

75. (previously presented) The system of Claim 72 further comprising:

- vi. logic in the host computer or an intermediate device connected between the host computer and the resource constrained device to operate according to a finite state machine to transmit a polling message to the resource constrained device checking if the resource constrained device may want to transmit information to the host computer.

76. (previously presented) The system of Claim 75 wherein the host computer or intermediate device includes a Remote Access Server (RAS) and wherein ~~wherein~~ the logic to operate the host computer or intermediate device comprises logic to operate the host computer or intermediate device according to a finite state machine having a Polling state in which the host computer or intermediate device polls the resource limited device, a Get-from-card state in

which the host computer or intermediate device obtains packets of data from the resource constrained device, a Putting-to-card state in which the host computer or intermediate device transmits data to the resource constrained device, and a Checking RAS state in which the host computer or intermediate device checks whether RAS has any data to transmit to the resource constrained device.

77. (previously presented) The system of Claim 76 further comprising logic to operate the host computer or the intermediate device to transition among the states of the finite state machine.
78. (previously presented) The system of Claim 61 wherein the resource-constrained device is a smart card.
79. (previously presented) The system of Claim 61 wherein the resource-constrained device is a MultiMediaCard (MMC).